CLAIMS

1. A time-resolved measurement apparatus for acquiring position information and timing information of a quantum beam generated due to excitation of a sample, comprising:

a signal generator for generating a reference time pulse in synchronization with the excitation of the sample;

a detector for detecting the quantum beam and for generating a position signal corresponding to a detection position and a detection timing pulse synchronized with a detection timing;

a position calculator for calculating the detection position using the position signal;

a time difference measuring device for measuring a time difference between the reference time pulse and the detection timing pulse; and

a data processor for storing the detection position calculated by the position calculator and the time difference measured by the time difference measuring device, in association with each other,

the detector having a position-sensitive electron multiplier tube,

the electron multiplier tube having an entrance window that transmits the quantum beam, first and second micro channel plates for generating an electron at a position corresponding to an incidence position of the quantum beam on the entrance window and for multiplying the electron while maintaining the position, and an anode,

the first micro channel plate having an input face located opposite and apart from the entrance window, and an output face located opposite and apart from the second micro channel plate,

the second micro channel plate having an input face located opposite and apart from the output face of the first micro channel plate, and an output face located opposite and apart from the anode, and

the detection timing pulse being generated in response to a potential change that occurs when electrons multiplied by the first micro channel plate are emitted from the first micro channel plate, and being fed to the time difference measuring device.

2. The time-resolved measurement apparatus according to claim 1, further comprising:

a first stack having the first micro channel plate, and at least one micro channel plate disposed on the input face of the first micro channel plate; and

a second stack having the second micro channel plate, and at least one micro channel plate disposed on the input face of the second micro channel plate and located opposite and apart from the first micro channel plate.

3. The time-resolved measurement apparatus according to claim 2, wherein the first stack is located opposite the entrance window with no other micro channel plate being interposed between the entrance window and the first stack.

4. The time-resolved measurement apparatus according to claim 2 or 3, wherein the first stack has an electron multiplication factor higher than that of the second stack.

5. The time-resolved measurement apparatus according to any one of claims 1 to 4, wherein the position-sensitive electron multiplier tube is a position-sensitive photomultiplier tube further comprising a

photocathode for converting the quantum beam into a photoelectron by photoelectric effect, the photocathode being disposed between the entrance window and the input face of the first micro channel plate, and

wherein the first micro channel plate is located opposite the photocathode and receives the photoelectron from the photocathode to generate and multiply secondary electrons.

6. A position-sensitive electron multiplier tube comprising:

an entrance window that transmits a quantum beam;

first and second micro channel plates for generating an electron at a position according to an incidence position of the quantum beam on the entrance window and for multiplying the electron while maintaining the position;

an anode located opposite the second micro channel plate; and

a pulse reading circuit for acquiring a pulse signal in response to a potential change that occurs when electrons multiplied by the first micro channel plate are emitted from the first micro channel plate,

the first micro channel plate having an input face located opposite and apart from the entrance window, and an output face located opposite and apart from the second micro channel plate,

the second micro channel plate having an input face located opposite and apart from the output face of the first micro channel plate, and an output face located opposite and apart from the anode, and

the pulse reading circuit being connected to the output face of the first micro channel plate.

7. The position-sensitive electron multiplier tube according to claim 6, further comprising:

a first stack having the first micro channel plate, and at least one micro channel plate disposed on the input face of the first micro channel plate; and

a second stack having the second micro channel plate, and at least one micro channel plate disposed on the input face of the second micro channel plate and located opposite and apart from the first micro channel plate.

8. The position-sensitive electron multiplier tube according to claim 7, wherein the first stack is located opposite the entrance window with no other micro channel plate being interposed between the entrance window and the first stack.

9. The position-sensitive electron multiplier tube according to claim 7 or 8, wherein the first stack has an electron multiplication factor higher than that of the second stack.

10. The position-sensitive electron multiplier tube according to any one of claims 6 to 9, further comprising a photocathode for converting the quantum beam into a photoelectron by photoelectric effect, the photocathode being disposed between the entrance window and the first micro channel plate, and

wherein the first micro channel plate is located opposite the photocathode and receives the photoelectron from the photocathode to generate and multiply secondary electrons.